Southern California Association of Marine Invertebrate Taxonomists

October, 2004

# SCAMIT Newsletter

Vol. 23, No. 6

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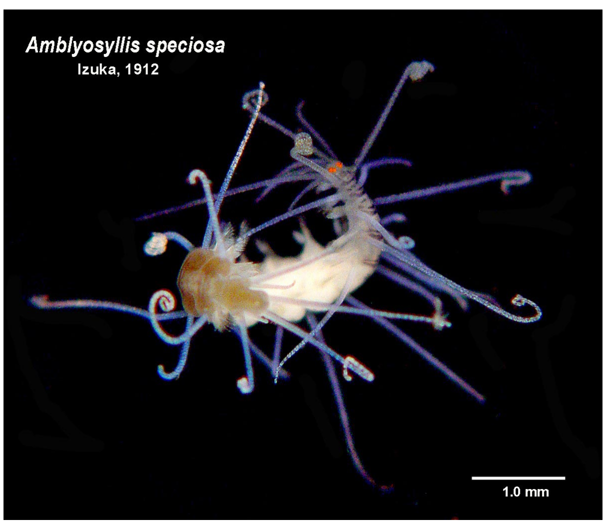
| **SUBJECT:** | **Corophoidae** |
| **GUEST SPEAKER:** | **John Chapman** |
| **DATE:** | **14 February 2005** |
| **TIME:** | **9:30 a.m. to 3:30 p. m.** |
| **LOCATION:** | **Natural History Museum of Los Angeles County** |




CSD Lab Display tank
Photo by R. Rowe 1/05

## OCTOBER MINUTES

At the SCAMIT meeting on October 18th, Todd Haney (UCLA/ NHMLAC) and Cheryl Brantley (LACSD) gave a PowerPoint presentation on two recent research cruises aboard the R/V *Atlantis*. Both cruises were led by Dr. Janet Voight of Chicago's Field Museum, their purpose being to survey the diversity of invertebrates associated with hydrothermal vents in the East Pacific. The first 3-week cruise was to the East Pacific Rise in November, 2003, and Todd served as the crustacean biologist on that cruise. The second 1-week cruise was to the Gorda and Juan de Fuca Ridges in September, 2004. Todd and Dr. Jody Martin were the crustacean biologists, and Cheryl was the polychaete biologist.

Todd began the presentation with an overview of the cruise missions and some general information on the ship and crew, including images of the R/V *Atlantis* and a narrated video clip describing the DSMV *Alvin* operations.

Todd then described his experience aboard the ship during cruise 11-03 to the East Pacific Rise. He shared some of the color images that he had produced while working in the shipboard lab, which were primarily digital photos of a variety of vent-associated invertebrates.

Sixteen dives were made during the cruise. Two of the dive sites were exploratory areas of very diffuse venting, where *Alvin* cruised just above a striking seafloor of pillow basalts, sheet flows and crevices. The two other areas sampled were well-studied sites (9N, 13N), where organisms and rocks were sampled directly from vents. Regarding those animals observed and/or collected during the deep-sea dives, Todd made the following comments. *Nematocarcinus* was the most abundant decapod crustacean observed during exploratory dives in areas of diffuse venting, although large numbers (400+) of the galatheid crab *Munidopsis* and of the vent crab *Bythograea* were also observed each dive. At least 10 species of gammaridean amphipods were recorded, ranging from eusirids found on the hexactinellid sponge *Caulophacus* to pardaliscids, such as *Halice hesmonectes*, that are more tightly associated with vents. Asellotan isopods were present at the vents but were rare. Hundreds of specimens of the leptostracan *Dahlella* were added to the known collections.

Dr. Meg Daly (Ohio State University) participated in the cruise as a specialist on Cnidaria and was richly rewarded by collections of stauromedusae, octocorals and several species of anemones. Among many observations she made, Meg noted that one of the anemones commonly identified as a cerianthid actually was not a member of that group. The discovery of a field of stauromedusae at depth was only the second or third report of its kind, and the animal represented a new species.

Two species of tubeworms, *Riftia* and *Tevnia*, were collected. The Pompeii worm *Alvinella* was collected in large numbers as well as polynoid polychaetes (scale worms), which were the focus of science party member Dr. Stephane Hourdez.

The most common and conspicuous echinoderms encountered were brisingid seastars and ophiuroids, although an unidentified holothuroidean was also collected.

The molluscan fauna ranged from gastropods to the vent octopus *Vulcanoctopus*. Todd showed some interesting video footage of a vent octopus approaching *Alvin* and that was later narrated by Janet Voight. A cirrate octopus was also collected. The most abundant molluscs were the limpets (*e.g.*, *Lepetodrilus* and *Eulepetopsis*). An abbreviated gallery with images of some of these animals is available on-line via

http://crustacea.nhm.org/gallery

Finally, Todd noted that the cruise was impressive as a highly collaborative effort among geologists from UC Davis, chemists from the University of New Hampshire, and a team of taxonomists from multiple institutions. Although the survey of invertebrate diversity held priority, a significant amount of data was collected from water and basalt samples. Additionally, while organisms were studied in the shipboard lab, the UC Davis team was busy throughout the night using *Atlantis'* Sea Beam multi-sonar system to produce detailed maps of the area's bathymetry. Janet Voight offered an exceptionally well-organized and productive research cruise. The biological material collected is currently housed at the Field Museum. For more information on the cruise to the East Pacific Rise, one can visit the Expeditions webpage hosted at the Field Museum. A short article describing the cruise and written by the science party is also available in the April 2004 issue of the Ridge 2000 Events Newsletter (see the taxonomic tools section of the SCAMIT web site).

Cheryl was up next and focused her presentation on the second week-long cruise that left from Astoria, OR. She began her presentation with the *Atlantis* leaving the dock and showed a small video clip of the harbor pilot being transferred back to the Pilot boat after navigating the ship thru the channel. A few photos of the interior cabins and laboratory spaces on the ship were shown. Cheryl had many photos of the launch and recovery of *Alvin* from the *Atlantis*. She described the launch procedure which included a small *Avon* boat, and two swimmers that assist with closing the hatch and securing the manipulator arms before and after each dive. She also showed photos of the basket on the front of the *Alvin* that holds all the "bioboxes" and suction samplers where the collections of animals and sediment are stored during dives. Much to the delight of the audience, a small video clip of Jody's baptism of ice water after his first dive in the *Alvin* was also shown.

One of the main goals of the second cruise was to retrieve blocks of wood that were placed at the same 4 dive sites two years previously by Dr. Voight. The hope was that these blocks would act as settling plates for some of the unique animals that live in and around the hydrothermal vents. These blocks were in mesh dive bags with large plastic floating markers tied to the bags. With excellent navigation by the *Alvin* pilots and "top lab," all of the blocks were retrieved.

Cheryl was able to photograph many of the live worms that came off the wood blocks and sediment samples, and showed them during the presentation. These included the tubeworm, *Ridgeia*, several species of branchiate scaleworms, capitellids, *Amphisamytha galapagensis*, a common vent ampharetid, and *Paralvinella sulfincola* with its distinct yellow coloring. She commented that it was more challenging than she had expected to photograph thru a microscope on a moving ship.

Cheryl also showed a DVD of actual dive footage taken from the *Alvin*. It included highlights from each of the 4 dives. Besides seeing the topography of the vent sites with the sulfide mounds and huge clumps of tubeworms, it was very interesting to see the manipulator arms in action using the temperature probes, push cores, suction samplers and collecting the wood blocks. The DVD also showed galatheid and oregoniid crabs, deep-sea octopus, pycnogonids, scaleworms, anemones, sea cucumbers and brittlestars.

The presentation concluded with slides of the *Atlantis* going thru the Hiram Chittenden locks in Seattle and docking at the University of Washington. Cheryl commented that it had been a great cruise with good weather and excellent food, especially since no cooking or clean up was involved. She now felt very spoiled for work-at-sea onboard LACSD's *Ocean Sentinel*.

The presentations by Cheryl and Todd concluded the morning portion of the meeting. After lunch we were treated to a talk by Don Cadien (LACSD) on the slope fauna of the B'03 project. Don has been kind enough to write a synopsis of his presentation and it is included below.

**Preliminary Report on the Benthic Infauna of the Continental Slope within the Southern California Bight based on samples collected in the Bight'03 Regional Monitoring Project – D. B. Cadien, CSDLAC 18 October 2004 SCAMIT Meeting, NHMLAC**

Bight'03 is the third regional monitoring project drawing on the combined efforts of the major ocean dischargers in southern California, academia, and regulatory agencies. It was preceded by the proof-of-concept trial Southern

California Bight Pilot Project in 1994, and the B'98 Regional Monitoring Project in 1998. All sampling was performed in the summer of 2003, from July to September. The design of this project included a sampling stratum covering depths of 200-500m on the upper slope. This is an area not sampled by either of the two preceding regional efforts. Physical and chemical sampling was scheduled for performance in a further stratum, between 500 and 1000m at a limited number of stations (32) to provide data for mass-balance modeling of chemical inputs. This sampling was performed by staff of the Channel Islands National Marine Sanctuary augmented by SCCWRP (Southern California Coastal Water Research Project).

As these samples were gathered it became obvious to those in the field that biological samples could be retained from the collected sediments, and might prove of value if funds and/or volunteers could be found to cover their processing. In consequence 32 samples from between 480 and 960m were collected for analysis of benthic infauna as well as physical and chemical sediment characteristics. The infaunal samples were taken and processed using the standard shipboard and laboratory protocols described in the Bight'03 Field Manual and Bight'03 Laboratory Manual. The results of this sample analysis would therefore, be fully compatible with the results of the other portions of the Bight'03 project, and could be included in a combined analysis. We are currently finalizing the last bits of data from sample processing and identification. Quality control analyses are complete, and a synoptic review of the taxonomic data on the infaunal invertebrates collected has been performed. Small pockets of data from analysis of particular groups by specialists are not quite available yet (with one exception). Full data analysis has not yet been performed. In consequence the present report is very preliminary, and the only analysis is on the bathymetric distribution of the animals and the communities they constitute as seen in the current non-final dataset.

The laboratory processing of the collected samples was put up for grabs. Samples were offered to any of the participating groups who were interested, and three took some of them. Unanticipated scheduling difficulties forced both MEC Applied Analytical Systems and the Municipal Wastewater Department of the City of San Diego to withdraw their processing offers. The County Sanitation Districts of Los Angeles County lab had only a small portion of the overall project samples allocated to it for infaunal analysis. In consequence, they were able to devote time to these samples, and ended up processing (sorting and identifying) all 32. The present report is intended to tell the rest of you what you missed, and show you some examples.

**Background Preparation –**

Prior to processing the collected samples, I prepared a background inventory of infauna which we at CSDLAC had seen in a series of 118 slope samples over the past 5 years. All the materials included came from deeper than 200m, and the listing was intended as a "heads up" for those who would be processing material collected at between 200 and 500m for the first time. Fortuitously I included bathymetric distribution records for animals from samples as deep as 860m in this initial background faunal list. I have used that list as a means of presenting what we did find, and what we thought we might and did not. The original list has been modified to exclude those taxa taken at greater than 200 and less than 500m which did not occur in the 32 deep samples collected by CINMS. It is therefore, a very selective list derived from a small sub-sample of sites. It does not include distributional information from the literature, but only that directly observed by CSDLAC staff.

The list is attached at the end of the newsletter. There are columns which show number of collections prior to B'03 in our restricted data set, the depth range of the sites where that taxon occurred, and a matching pair of columns for materials taken in the 500-1000m stratum during Bight'03. Taxa which were not included in the original list and which were added as a result of these samples are **SHOWN IN BOLD**. Please remember the bathymetric distribution shown is based only on those collections included in the initial list (118 samples taken by CSDLAC in the last 5 years) and 32 Bight'03 samples from the deep stratum. They are not a valid representation of the distribution of the species based on other sources in the published or grey literature. There are, however, extensions of the reported bathymetric range in several animals, and more will probably be detected as we get further into analysis of the data.

## NEW LITERATURE

The following were not distributed at the meeting, but are included here to alert readers to their existence.

POTWs, as sites of organic enrichment, often have a shallow RPD (redox potential discontinuity – where sediments change from oxic to anoxic) and support populations of animals with chemosymbionts. Both hot vents and cold seeps offer natural analogs to the POTW situation and support chemosymbiotic associations, often with clams. Goffredi et al (2004) describe such associations at cold seep sites in Monterey Bay between several species of vesicomyid clams and chemosymbiont bacteria. The authors investigated the symbiosis with various chemical and physical methods. While the symbionts were not the same in the seven vesicomyid species, they were genetically similar and all were gamma Proteobacteria. A series of detailed TEM images shows the relationship between the bacteria and host tissue.

The bivalve family Pectinidae has been a taxonomic problem for years since adult morphology is strongly influenced by environmental factors. A series of competing classifications has been proposed. Barucca et al (2004) sequenced the mitochondrial 16S and 12S rRNA genes of a cross-section of family members in an attempt to choose which, if any, of the current phylogenetic hypotheses is correct. They found that the classification proposed by Waller based on juvenile shell structure and sculpture was the best representation of the DNA evidence. Waller's arrangement seems very similar to that used in the Coan, Valentich Scott & Bernard west coast bivalve volume, so no changes from our current usage should be required.

More and more qualification seems necessary for some types of morphological evidence. The environmentally induced adult shell variation seen in the pectinids is not common, and neither is sexual dimorphism, which also occurs in at least some gastropods. Normally such sexual variability is evident in the shell. Mutlu (2004), however, found noticeable variation in radular morphology between male and female *Conomurex persicus*, a strombid gastropod from the Mediterranean. Previous studies have found dimorphism in some other families, but this is the first record for a strombid. Combined with the variation due to food substrate demonstrated for a lacunid by Padilla (discussed in a previous newsletter) this additional type of radular variation diminishes one's trust that radular evidence is definitive. Things just keep getting more complicated the more knowledge we have!

Evolutionary radiation of barnacles is addressed by Pérez-Losada et al (2004). Using both molecular and morphologically based information they evaluate a series of timing hypotheses on the evolutionary history of the group. They found good correspondence between the lines of evidence, and concluded that the four-plated ibloids were the most primitive thoracicans. All thoracicans were, however, derived from a stalked lepadomorph ancestral form (with the plateless Heteralepadomorpha as sister group). The lepadomorphs are monophyletic. Best estimates of the timing of divergences is

Heterolepadomorpha/Iblamorpha 530MYA, Iblamorpha/Lepadomorpha 340MYA, and Lepadomorpha/Verrucomorpha 120MYA. The balanomorphs diverged from the verrucomorphs considerably more recently. All the above are variable, and are rough consensus estimates of several methods. The paper should be consulted for a fuller discussion of the timing issues, and the caveats associated with the various hypotheses.

The increasing use of molecular data to help unravel phylogenetic questions where morphology is equivocal is a wonderful development in taxonomic technique. Unfortunately it is seldom available for organisms from the deep sea. Such forms are usually small, difficult to obtain, and taken remotely. Taxonomic determinations of such material often happen many years after the samples are obtained and fixed in formalin. Such formalin preserved tissues present particular problems in recovery of DNA data. In many cases attempts have not even been made to recover DNA from formalin preserved tissues. Boyle et al (2004) present a nice synthesis of the results of attempts at recovery of molecular data from a variety of formalin preserved archival materials, some over 100 years old. While recovery rates were lower than for fresh material, they were not uniformly bad. Many samples could be successfully sequenced despite initial preservation in formalin. Combined with other recent how-to methodological papers (listed and summarized here), grounds for use of formalized samples as semi-reliable molecular source material are laid in this paper.

Local participants in the Southern California Bight regional monitoring studies in 1998 and 2003 are familiar with the Benthic Response Index (BRI) developed on the basis of the initial regional pilot sampling in 1994 (Smith et al 2001). A very similar new index is proposed by Rosenberg et al (2004 – yes, the same Rosenberg as in the Pearson-Rosenberg model). Interestingly the index applies a very similar developmental method to a somewhat different basic approach. In the BRI a pollution gradient was established on the basis of analysis of a large number of locally collected samples. The population center-point of a species is then projected onto the gradient to produce a "pollution tolerance score". In the new index the relative "pollution tolerance" of a given animal is determined by scoring the point at which 95% of a species population can no longer tolerate ambient conditions. The two indices are thus polar opposites: as the BRI rises it reflects degradation of the environment, while a rising Benthic Quality Index (BQI proposed in the present paper) indicates increasingly good conditions. Each index seems a good candidate for validation of the other; a most delightful prospect. The BQI, since it is not as locally tied as the BRI, may prove much easier to use in adjacent areas.

## UPCOMING MEETING

THE FOURTH INTERNATIONAL MARINE BIOINVASIONS CONFERENCE will be held in Wellington, New Zealand from August 23-26, 2005.

The Conference will address a wide range of issues about marine invasions, including ecological and evolutionary consequences, transport vectors, patterns of dispersion, management strategies (prevention, control, and eradication), economic impacts, education and outreach initiatives.

Co-hosts are Biosecurity New Zealand (Ministry of Agriculture and Forestry) and the MIT Sea Grant Program (USA). The meeting will be held in conjunction with the New Zealand Marine Sciences Society.

Please watch for the website and additional announcements to be posted in early January.

## BIBLIOGRAPHY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**List of species taken in 115 CSDLAC slope samples prior to B'03, and in 32 500-1000m samples from B'03**

| Phylum | Class | Family | Species | N (occ) | Z (m) | B'03 N >500m | B'03 Z (m) |
|---|---|---|---|---|---|---|---|
| Annelida | | | | | | | |
| | Polychaeta | | | | | | |
| | | Acoetidae | Polyodontes panamensis | 1 | 600 | - | |
| | | Ampharetidae | Ampharete acutifrons | 2 | 296-830 | - | |
| | | | Amphicteis scaphobranchiata | 3 | 253-660 | - | |
| | | | **Asabellides lineata** | - | | 1 | 600 |
| | | | Eclysippe trilobata | 24 | 305-860 | 11 | 480-850 |
| | | | Glyphanostomum pallescens | 7 | 600-830 | - | |
| | | | Lysippe sp A | 2 | 660-826 | - | |
| | | | Lysippe sp B | 2 | 576-643 | 1 | 600 |
| | | | Melinna heterodonta | 27 | 294-643 | 3 | 780-850 |
| | | | Melinna oculata | 1 | 840 | - | |
| | | | Mooresamytha bioculata | 5 | 253-826 | - | |
| | | | Mugga wahrbergi | 1 | 643 | - | |
| | | | Paralysippe annectens | 23 | 542-860 | 7 | 600-850 |
| | | | **Paramage scutata** | - | | 2 | 830-900 |
| | | | **Rhodine bitorquata** | - | | 1 | 700 |
| | | | **Sabellides manriquei** | - | | 1 | 600 |
| | | | Samytha californiensis | 3 | 295-797 | - | |
| | | | Ampharetidae sp SD1 | 1 | 643 | - | |
| | | Amphinomidae | Chloeia pinnata | 33 | 253-466 | 1 | 850 |
| | | Arabellidae | **Drilonereis falcata** | - | | 1 | 850 |
| | | Capitellidae | Anotomastus gordioides | 1 | 502 | - | |
| | | | Dodecamastus mariaensis | 19 | 502-800 | 1 | 635 |
| | | | Heteromastus filobranchus | 15 | 290-660 | - | |
| | | | Mediomastus ambiseta | 1 | 506 | - | |
| | | | Notomastus magnus | 3 | 294-660 | - | |
| | | | Notomastus sp base 1 | 1 | 553 | - | |
| | | Chaetopteridae | Phyllochaetopterus limicolus | 27 | 253-860 | - | |
| | | | Spiochaetopterus costarum | 8 | 298-860 | 6 | 628-990 |
| | | Cirratulidae | Aphelochaeta glandaria CMPLX | 37 | 253-830 | - | |
| | | | Aphelochaeta monilaris | 45 | 253-404 | 2 | 480-792 |
| | | | **Aphelochaeta petersenae** | - | | 2 | 650-780 |
| | | | Aphelochaeta williamsi | 2 | 353-506 | - | |
| | | | Aphelochaeta sp base 1 | 1 | 826 | - | |
| | | | **Aphelochaeta sp LA2** | - | | 1 | 630 |
| | | | **Chaetozone corona** | - | | 1 | 650 |
| | | | **Chaetozone gracilis** | - | | 1 | 868 |
| | | | **Chaetozone sp LA1** | - | | 1 | 610 |
| | | | Monticellina cryptica | 3 | 253-813 | 11 | 480-960 |
| | | | Monticellina tesselata | 16 | 295-857 | 1 | 900 |
| | | | Protocirrineris sp B | 1 | 825 | - | |
| | | Cossuridae | Cossura candida | 2 | 300-506 | 1 | 960 |
| | | | Cossura pygodactylata | 1 | 643 | - | |
| | | | Cossura sp. A | 6 | 292-643 | - | |
| | | Fauveliopsidae | **Fauveliopsis glabra** | - | | 6 | 480-868 |
| | | Flabelligeridae | Brada villosa | 12 | 434-643 | 1 | 628 |
| | | | **Diplocirrus sp LA1** | - | | 1 | 600 |
| | | | Pherusa neopapillata | 3 | 305-506 | - | |
| | | Glyceridae | Glycera branchiopoda | 4 | 713-830 | - | |
| | | | Glycera nana | 26 | 253-506 | - | |
| | | Goniadidae | Glycinde armigera | 38 | 290-840 | 1 | 600 |

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|---|---|---|---|---|---|
| Hesionidae | Gyptis sp alpha | 1 | 506 | - | |
| | Podarkeopsis glabrus | 3 | 298-305 | 1 | 719 |
| Lumbrineridae | Lumbrineris index | 5 | 292-506 | - | |
| Maldanidae | Euclymeninae sp A | 3 | 294-680 | 2 | 780-868 |
| | Maldane californiensis | 3 | 553-643 | 8 | 610-794 |
| | Maldane sarsi | 39 | 253-580 | 5 | 480-757 |
| | **Petaloproctus ornatus** | - | | 1 | 700 |
| | **Sonatsa carinata** | - | | 3 | 660-754 |
| Nereididae | Gymnonereis crosslandi | 2 | 253-580 | - | |
| Nephtyidae | Nephtys caecoides | 2 | 300-600 | - | |
| | Nephtys cornuta | 43 | 253-830 | 2 | 606-610 |
| Opheliidae | Ophelina acuminata | 1 | 553 | - | |
| | **Ophelina farallonensis** | - | | 1 | 850 |
| Orbiniidae | Califia calida | 1 | 680 | 2 | 650-792 |
| Oweniidae | Galathowenia oculata | 1 | 680 | - | |
| | Myriochele gracilis | 4 | 321-643 | 6 | 610-750 |
| | Myriochele olgae | 3 | 294-643 | - | |
| Paraonidae | Aricidea (Acmira) catherinae | 2 | 295-298 | 1 | 610 |
| | Aricidea (Acmira) horikoshii | 1 | 840 | - | |
| | Aricidea (Acmira) lopezi | 4 | 294-660 | - | |
| | Aricidea (Acmira) rubra | 1 | 860 | - | |
| | Aricidea (Acmira) simplex | 3 | 797-830 | - | |
| | Aricidea (Allia) sp A | 1 | 253 | 1 | 480 |
| | Aricidea (Allia) sp beta | 1 | 643 | - | |
| | Levinsenia gracilis | 5 | 253-305 | 5 | 606-780 |
| | Levinsenia multibranchiata | 3 | 295-305 | 1 | 610 |
| Pectinariidae | Pectinaria californiensis | 50 | 290-502 | - | |
| PIlargidae | Ancistrosyllis groenlandica | 24 | 294-580 | 1 | 700 |
| | Sigambra tentaculata | 5 | 506-643 | 2 | 606-610 |
| Polynoidae | Eucranta anoculata | 1 | 713 | - | |
| | Harmothoe fragilis | 1 | 826 | - | |
| | Hesperonoe laevis | 2 | 295-797 | - | |
| | Malmgreniella scriptoria | 5 | 292-306 | 1 | 600 |
| | Malmgreniella sp. | 2 | 506-511 | - | |
| | Subadyte mexicana | 12 | 290-656 | - | |
| Sabellidae | Chone sp C | 1 | 502 | - | |
| | **Euchone incolor** | - | | 1 | 650 |
| | Fabrisabella sp A | 2 | 294-576 | 1 | 780 |
| | **Fabrisabella sp LA1** | - | | 1 | 610 |
| | Potamethus sp A | 1 | 600 | - | |
| | **Sabellidae sp LA1** | - | | 1 | 700 |
| Serpulidae | Protula superba | 1 | 826 | - | |
| Siboglinidae | **Siboglinum veleronis** | - | | 1 | 868 |
| Spionidae | **Dipolydora caulleryi** | - | | 1 | 650 |
| | Laonice cirrata | 17 | 290-830 | 2 | 635-850 |
| | Laonice nuchalis | 6 | 290-797 | 1 | 700 |
| | **Leitoscoloplos panamensis** | - | | 2 | 650-700 |
| | Paraprionospio pinnata | 61 | 290-576 | - | |
| | Prionospio (Prionospio) ehlersi | 19 | 292-580 | - | |
| | Spiophanes duplex | 3 | 253-353 | 1 | 780 |
| | Spiophanes fimbriata | 17 | 253-860 | 1 | 830 |
| | Spiophanes wigleyi | 5 | 800-860 | 1 | 830 |
| | **Spiophanes sp K** | - | | 1 | 894 |
| Terebellidae | Lanassa gracilis | 3 | 600-703 | - | |
| | Phisidia sanctamariae | 2 | 600-660 | 1 | 600 |
| | Phisidia sp base 1 | 4 | 543-660 | - | |

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|---|---|---|---|---|---|---|
| | | Pista wui | 45 | 290-840 | 3 | 610-850 |
| | | Proclea sp A | 1 | 580 | - | |
| | Trichobranchidae | Artacama coniferi | 1 | 600 | - | |
| | | Artacamella hancocki | 1 | 580 | - | |
| | | Terebellides californica | 5 | 580-840 | 3 | 600-850 |
| | | Terebellides reishi | 2 | 294-660 | - | |
| | | **Trichobranchidae sp LA1** | - | | 2 | 610-792 |
| Cnidaria | | | | | | |
| | Campanulinidae | Oplorhiza polynema | 1 | 660 | - | |
| | Edwardsiidae | Metedwardsia sp A | 3 | 840-857 | - | |
| | Pennatulidae | Pennatula californica | 1 | 703 | - | |
| | Stachyptilidae | Stachyptilum superbum | 3 | 542-826 | - | |
| | Virgulariidae | Virgularia agassizii | 1 | 749 | - | |
| Sipuncula | | | | | | |
| | Golfingiidae | **Golfingia sp 1** | - | | 1 | 650 |
| | Sipunculidae | **Sipunculus nudus** | - | | 1 | 700 |
| Echiura | | | | | | |
| Echiurida | | | | | | |
| | Thalassematidae | Arhynchite californicus | 13 | 295-800 | - | |
| Mollusca | | | | | | |
| Bivalvia | | | | | | |
| | Carditidae | Cyclocardia ventricosa | 12 | 295-580 | - | |
| | Cuspidariidae | Luzonia walleri | 7 | 480-749 | 1 | 628 |
| | Galeommatidae | Divariscintilla sp A | 1 | 506 | 1 | 600 |
| | Hiatellidae | Saxicavella pacifica | 12 | 295-580 | - | |
| | Lucinidae | Lucinoma annulatum | 3 | 294-790 | 1 | 610 |
| | | Parvilucina tenuisculpta | 48 | 215-643 | - | |
| | Montacutidae | Rochefortia compressa | 9 | 295-660 | - | |
| | | Rochefortia tumida | 8 | 295-800 | - | |
| | | **Rochefortia sp LA1** | - | | 2 | 635-750 |
| | Mytilidae | Dacrydium pacificum | 6 | 502-840 | 1 | 719 |
| | Neilonellidae | **Neilonella mexicana** | - | | 2 | 780-960 |
| | | Neilonella ritteri | 11 | 486-643 | 9 | 600-960 |
| | Nuculanidae | Nuculana conceptionis | 18 | 215-576 | - | |
| | Pectinidae | Delectopecten vancouverensis | 6 | 294-857 | 4 | 850-900 |
| | Solemyidae | **Solemya reidi** | - | | 1 | 660 |
| | Thyasiridae | Adontorhina cyclia | 10 | 253-848 | 7 | 480-960 |
| | | **Adontorhina lynnae** | - | | 5 | 610-960 |
| | | Axinodon redondoensis | 9 | 542-830 | 14 | 480-868 |
| | | Thyasira flexuosa | 4 | 253-502 | - | |
| | Verticordiidae | Dallicordia alaskana | 1 | 576 | 1 | 700 |
| | Vesicomyidae | Vesicomya elongata | 1 | 790 | - | |
| | | Vesicomya lepta | 2 | 703-790 | - | |
| Gastropoda | | | | | | |
| | Cerithiidae | Lirobittium rugatum | 13 | 294-502 | - | |
| | Columbellidae | Astyris permodesta | 23 | 300-857 | 5 | 606-830 |
| | Gastropteridae | Gastropteron pacificum | 16 | 292-680 | - | |
| | Philinidae | **Philine polystrigma** | - | | 1 | 868 |
| | Retusidae | Volvulella californica | 2 | 309-553 | - | |
| | Ringiculidae | Microglyphis brevicula | 5 | 290-713 | - | |
| | Rissoidae | Alvania rosana | 6 | 486-643 | 1 | 600 |
| | unknown | Bullomorpha sp A | 1 | 790 | 1 | 894 |
| Scaphopoda | | | | | | |
| | Gadilidae | Polyschides californicus | 3 | 327-378 | 1 | 792 |
| | | Polyschides tolmiei | 40 | 215-860 | 11 | 600-900 |
| | Laevidentaliidae | Rhabdus rectius | 16 | 215-826 | 3 | 600-635 |

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|---|---|---|---|---|---|---|
| Aplacophora | | | | | | |
| | Chaetodermatidae | Chaetoderma hancocki | 5 | 553-830 | 8 | 579-794 |
| | | **Chaetoderma sp A** | - | | 1 | 660 |
| | Falcidentidae | Falcidens hartmanae | 13 | 309-703 | 20 | 310-960 |
| | | Falcidens longus | 6 | 292-321 | 27 | 21.5-660 |
| | | Furcillidens incrassatus | 1 | 749 | 3 | 610-668 |
| | Limifossoridae | Limifossor fratula | 44 | 215-660 | 26 | 131-750 |
| | Prochaetodermatidae | Spathoderma californica | 5 | 580-660 | 2 | 610 |
| | | Chevroderma sp LA1 | 2 | 643 | - | |
| Nemertea | | | | | | |
| Anopla | | | | | | |
| | Lineidae | Cerebratulus californiensis | 22 | 294-830 | 3 | 630-750 |
| | | Micrura wilsoni | 1 | 800 | - | |
| | Tubulanidae | Tubulanus nothus | 2 | 294-797 | - | |
| | | Tubulanus polymorphus | 9 | 297-857 | 1 | 610 |
| | unknown | Palaeonemertea sp D | 13 | 294-860 | 1 | 700 |
| Enopla | | | | | | |
| | Amphiporidae | Amphiporus cruentatus | 1 | 857 | - | |
| Arthropoda | | | | | | |
| Ostracoda | | | | | | |
| | Cylindroleberididae | **Bathyleberis sp LA1** | - | | 1 | 757 |
| | Philomedidae | Euphilomedes producta | 13 | 292-576 | - | |
| | | **Philomedes sp LA1** | - | | 1 | 780 |
| Mysidacea | | | | | | |
| | Mysidae | Boreomysis californica | 1 | 643 | - | |
| Cumacea | | | | | | |
| | Diastylidae | Diastylis pellucida | 29 | 290-502 | 1 | 480 |
| | | Diastylis sp C | 1 | 576 | - | |
| | | Leptostylis calva | 2 | 580-600 | - | |
| | Lampropidae | Hemilamprops sp A | 4 | 576-703 | 4 | 719-960 |
| | Leuconidae | Eudorella pacifica | 6 | 253-506 | 1 | 719 |
| | | Leucon bishopi | | | 6 | 610-780 |
| | | Leucon declivis | 7 | 466-840 | - | |
| | | Leucon magnadentata | | | 5 | 660-960 |
| | Nannastacidae | Campylaspis canaliculata | 5 | 553-713 | 1 | 628 |
| | | Campylaspis sp A | 3 | 295-703 | - | |
| Tanaidacea | | | | | | |
| | Apseudidae | Carpoapseudes caraspinosus | 2 | 506-580 | 3 | 650-868 |
| | Leptocheliidae | Leptochelia dubia | 1 | 680 | - | |
| Isopoda | | | | | | |
| | Antheluridae | **Ananthura luna** | - | | 1 | 868 |
| | Eurycopidae | Eurycope californiensis | 5 | 502-703 | 3 | 610-700 |
| | Munnopsidae | Belonectes sp A | 3 | 280-502 | - | |
| | | Ilyarachna acarina | 1 | 309 | 5 | 480-960 |
| | | Munnopsurus sp A | 5 | 309-600 | - | |
| Amphipoda | | | | | | |
| | Aeginellidae | n.gen. n.sp. | 7 | 302-797 | 8 | 630-960 |
| | Ampeliscidae | **Ampelisca coeca** | - | | 1 | 868 |
| | | Ampelisca plumosa | 8 | 553-860 | - | |
| | | Ampelisca unsocalae | 44 | 253-680 | 7 | 480-960 |
| | | **Byblis barbarensis** | - | | 9 | 600-960 |
| | Eusiridae | **Oradarea longimana** | - | | 1 | 757 |
| | Ischyroceridae | **Jassa slatteryi** | - | | 1 | 757 |
| | Liljeborgiidae | Listriella albina | 13 | 294-830 | 4 | 600-750 |
| | Lysianassidae | Lepidepecreum n. sp | 1 | 643 | - | |
| | | Orchomene pacifica | 1 | 580 | 1 | 780 |

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|---|---|---|---|---|---|---|
| | Oedicerotidae | Bathymedon pumilus | 8 | 294-542 | 2 | 635-719 |
| | | **Monoculodes glyconica** | - | | 1 | 794 |
| | | **Oediceropsis elsula** | - | | 1 | 757 |
| | Pardaliscidae | **Halicoides synopiae** | - | | 1 | 960 |
| | | Nicippe tumida | 10 | 294-576 | 1 | 600 |
| | | **Pardaliscella symmetrica** | - | | 1 | 868 |
| | Phoxocephalidae | **Cephalophoxoides homilis** | - | | 3 | 480-660 |
| | | **Harpiniopsis emeryi** | - | | 1 | 754 |
| | | Harpiniopsis epistomatus | 3 | 353-580 | 7 | 610-850 |
| | | Harpiniopsis fulgens | 6 | 215-327 | 2 | 700-754 |
| | | Harpiniopsis niadis | 1 | 643 | - | |
| | | **Harpiniopsis similis** | - | | 1 | 868 |
| | | Heterophoxus affinis | 1 | 303 | 3 | 480-850 |
| | | Heterophoxus ellisi | 17 | 215-486 | 2 | 660-700 |
| | | **Leptophoxus falcatus icelus** | - | | 1 | 780 |
| | | Rhepoxynius abronius | 1 | 680 | - | |
| | Podoceridae | Dulichia remis | 1 | 576 | - | |
| | Synopiidae | Syrrhoe longifrons | 3 | 253-326 | 1 | 850 |
| Decapoda | | | | | | |
| | Ctenochelidae | Callianopsis goniophthalma | 2 | 656-800 | - | |
| | Hippolytidae | Spirontocaris sica | 6 | 309-825 | - | |
| | Pinnotheridae | Pinnixa occidentalis | 3 | 294-576 | - | |
| Echinodermata | | | | | | |
| Ophiuroidea | | | | | | |
| | Amphiuridae | **Amphiodia diomedeae** | - | | 2 | 719-780 |
| | | **Amphipholis squamata** | - | | 1 | 894 |
| | Asteronychidae | Asteronyx longifissus | 1 | 656 | 1 | 610 |
| | Ophioscolecidae | **Ophioscolex corynetes** | - | | 1 | 610 |
| | Ophiuridae | Ophiospalma jolliensis | 1 | 656 | 2 | 610-700 |
| Echinoidea | | | | | | |
| | Brissidae | Brissopsis pacifica | 8 | 215-580 | - | |
| | | **Brissopsis sp LA1** | - | | 2 | 600-830 |
| | Schizasteridae | Brisaster latifrons | 18 | 215-580 | - | |
| Holothuroidea | | | | | | |
| | Molpadiidae | Molpadia intermedia | 1 | 300 | 1 | 850 |
| Chordata | | | | | | |
| Hemichordata | | | | | | |
| | Balanoglossidae | Balanoglossus sp. | - | | 1 | 750 |
| | Harrimaniidae | Saccoglossus sp. | 2 | 656-703 | - | |
| | | Stereobalanus sp. | 17 | 600-860 | 4 | 610-850 |